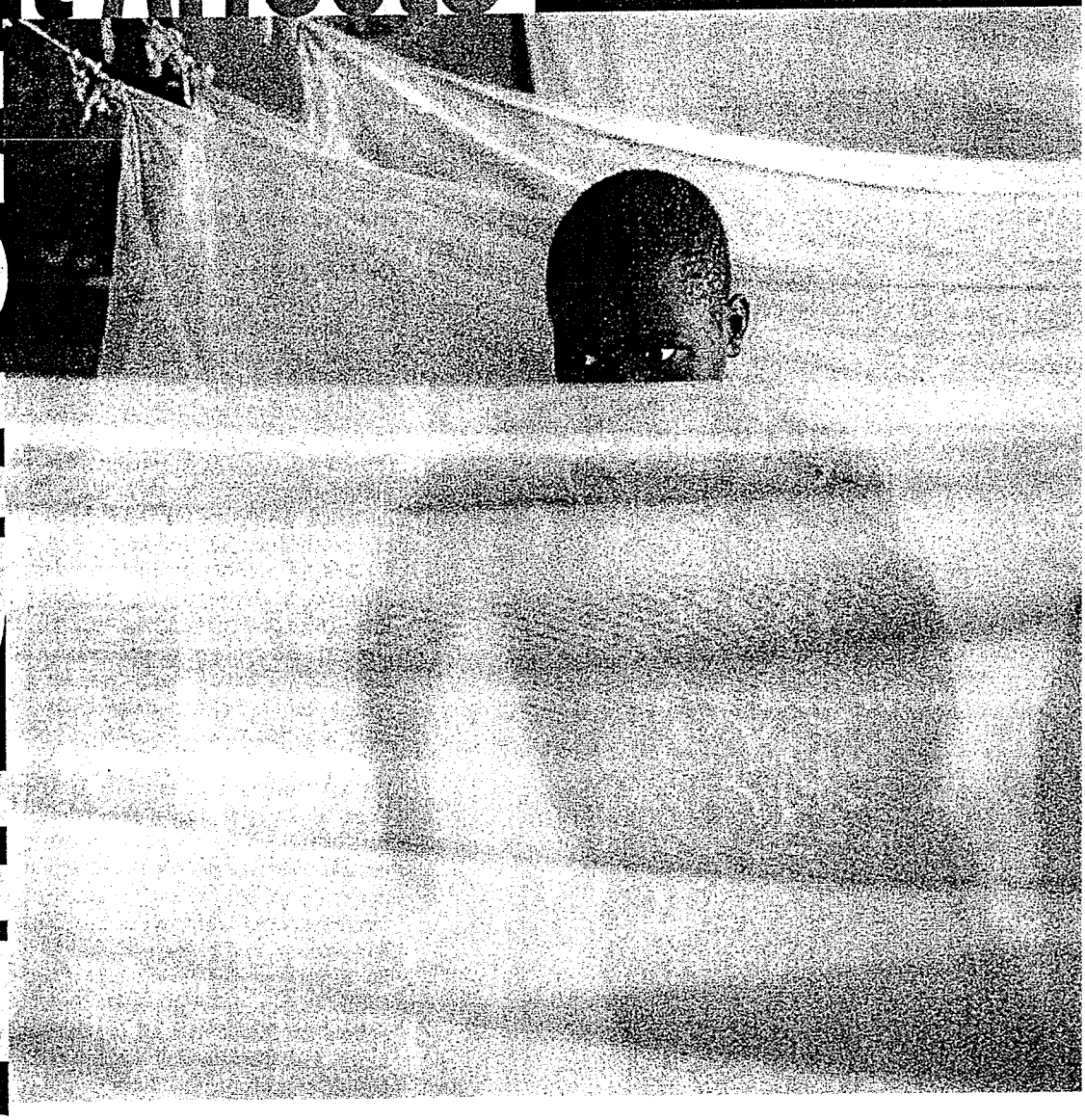
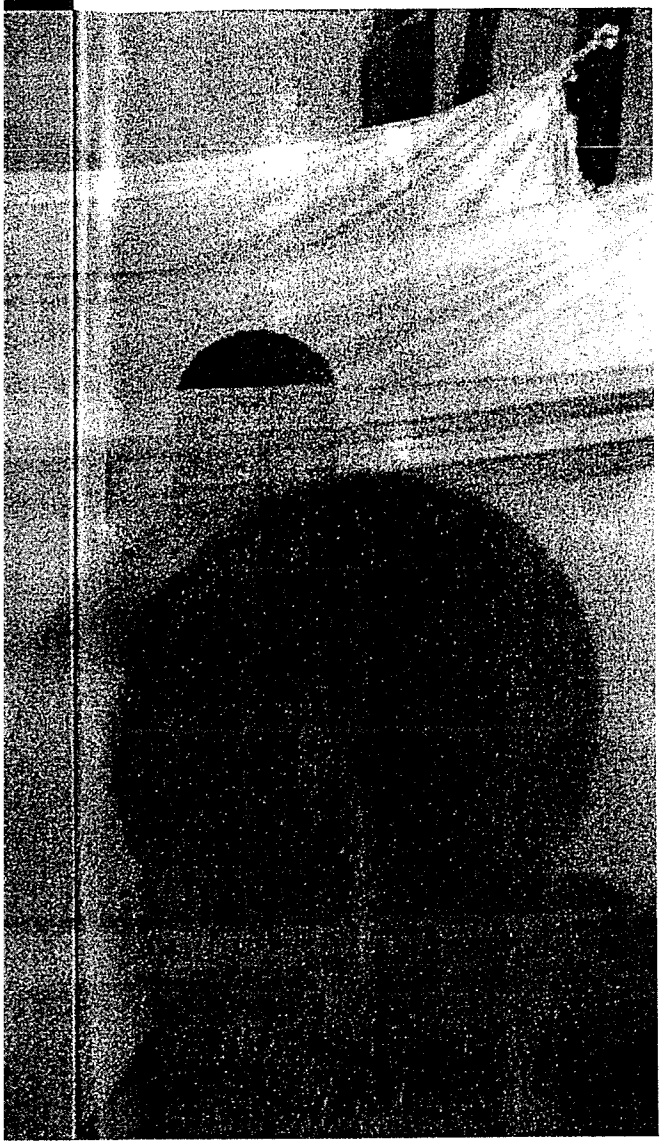
How It Affects Your Health

Expect more risk of heatstrokes, asthma, allergies and infectious disease By Christine Gorman



IT'S A FAIR BET THAT GLOBAL WARMING IS GOING TO LEAD TO A RISE IN HUMAN sickness and death. But what form they will take is difficult to say. We can be pretty sure that as average temperatures climb, there will be more frequent and longer heat waves of the sort that contributed to the death of at least 20,000 Europeans in August 2003. Other predictions are more tenuous. For example, rising temperatures could—if rainfall and other conditions are right—result in larger mosquito populations at higher elevations in the tropics, which could in turn contribute to the spread of malaria, dengue and other insect-borne infections. ■ Early indications are not encouraging. The World Health Organization (WHO) believes that even the modest increases in average temperature that have occurred since the 1970s have begun to take a toll. Climate change is responsible for at least 150,000 extra deaths a year—a figure that will double by 2030, according to WHO's conservative estimate. ■ As with so many public-health issues, a disproportionate part of the burden appears to be falling on the poorest of

Photograph for TIME by James Nachtwey—VII



DEATH BY MOSQUITO
Malaria kills more than 1 million people each year. Bed nets like these are being used to protect families all over sub-Saharan Africa

the poor. That doesn't mean, however, that the comparatively wealthy—who account for more than their share of greenhouse-gas emissions—will escape harm.

A look at three key factors affected by warming offers a hint of things to come.

AIR We're used to thinking of industrial and traffic pollution as having a detrimental effect on air quality. But all other things being equal, rising temperature by itself increases the amount of ground-level ozone, a major constituent of smog. So many studies have linked higher ozone levels to death rates from heart and lung ailments that many cities issue smog alerts to warn those at risk to stay indoors. You can expect more and longer alerts.

It gets worse. Higher levels of carbon dioxide favor the growth of ragweed and other pollen producers over other plants, according to Dr. Paul Epstein at Harvard's Center for Health and the Global Environment. In addition, ragweed churns out more pollen as CO_2 levels rise. Scientists have tied local spikes in asthma and allergy attacks to increases in molds and emissions from diesel engines. Apparently, the molds attach themselves to diesel particles, which deliver them more efficiently deep into the lungs. Add a plentiful helping of dust storms (from, for instance, the desertification of Mongolia or northern Africa) and a rise in drought-driven brushfires, and you have a made-to-order recipe for increasing respiratory distress worldwide.

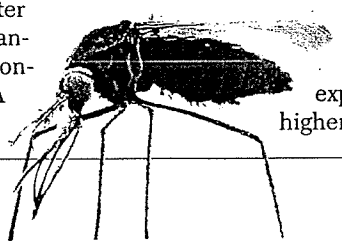
WATER Residents of the U.S. Gulf Coast don't have to be reminded that water can be a killer. You can usually evacuate people ahead of a major storm, but you can't evacuate infrastructure. "Thirteen of the 20 largest cities in the world happen to be located at sea level," says Dr. Cindy Parker of the Johns Hopkins School of Public Health in Baltimore, Md. That means that where people are most at risk from floods, so are hospitals and water-treatment plants. As we have seen in New Orleans, the health effects of losing those facilities persist long after the water has receded.

Another predicted consequence of global warming is heavier downpours, leading to more floods. The immediate hazard is drowning, but the larger issue is water quality. To take just one example, more than 700 U.S. cities—most of them older communities in the Northeast, Northwest and Great Lakes area—have sewer systems that regularly overflow into water supplies during heavy rainstorms, mixing dirty and clean water and sometimes requiring mandatory boiling to make contaminated tap water safe. A heavy rainfall preceded the majority of waterborne-disease outbreaks in the U.S. over the past 60 years, says Dr. Jonathan Patz of the University of Wisconsin at Madison.

Ocean-water patterns also play a role in human health. Mercedes Pascual and her colleagues at the University of Michigan have been poring over more than a century's worth of data on cholera outbreaks in Bangladesh and tying them to detailed temperature reports of the surface waters of the Pacific Ocean. True, Bangladesh isn't anywhere near the Pacific, but the researchers are using the temperature data as an indication of a larger weather pattern called the El Niño/Southern Oscillation, or ENSO. What they have found is that the severity of an epidemic is linked to water temperature—but only in years of higher-than-normal temperatures on the ocean's surface. More alarming: as the ENSO pattern has become more pronounced since the 1970s, the association with cholera has become even stronger.

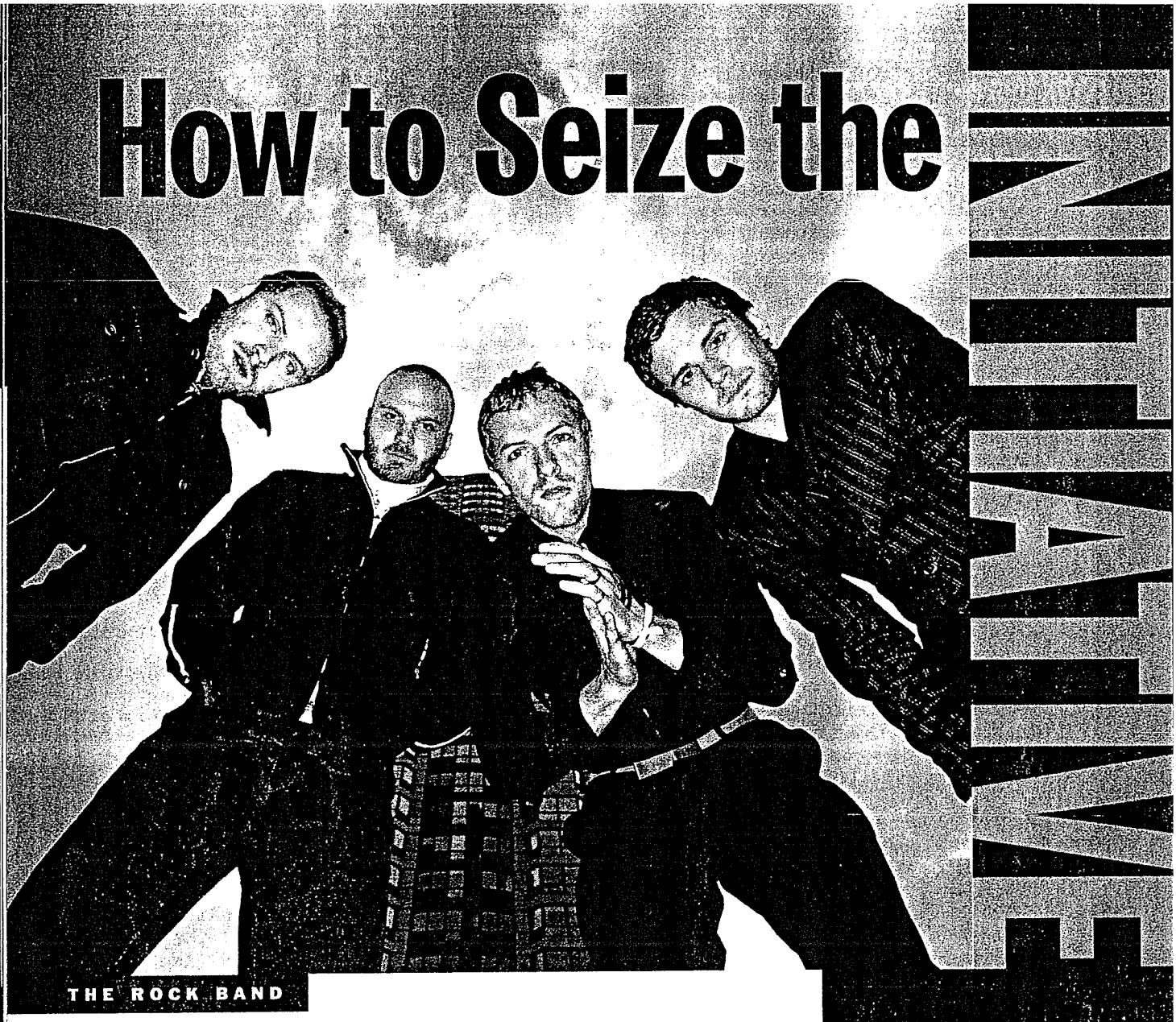
INSECTS The news here is not all bad. Ticks, for example, may not be able to survive hotter temperatures in the southwestern U.S. And global warming is unlikely to have much of an effect on malaria, as long as you focus on lowland areas (because those regions already have so many mosquitoes). That picture may change, however, as you move upward in elevation. Malaria has seen a dramatic upswing since the 1970s in highland cities like Nairobi (around 5,500 ft. above sea level). How much of that can be tied to temperature increases—as opposed to population movement, lapses in mosquito control or the spread of drug-resistant parasites—is a matter of debate. But because each year there are at least 300 million cases accounting for more than 1 million deaths, even a small uptick in the spread or severity of malaria could be devastating.

The tricky thing about all those predictions is that you can't point to any outbreak or any individual's death and say, "This occurred because of climate change." But we know that good public health relies on a long list of factors—the availability of doctors and nurses, effective medicines, clean water, proper sanitation—and that even today, millions of people die every year of what should be preventable diseases. With global warming, you can expect the death toll to be even higher. ■



DR. TONY BRAIN—PHOTO RESEARCHERS

How to Seize the Initiative



THE ROCK BAND

STEVEN DEWALL—RETINA

CAPITALIST TOOLS FOR CUTTING CO_2

WHEN COLDPLAY CUT *A RUSH OF Blood to the Head*, the rock band didn't want the album's production and distribution to add to the greenhouse gases flowing into the atmosphere. So, working with a small British firm, the CarbonNeutral Co., the group bought 10,000 mango trees for villagers in Karnataka, India. Since plants breathe in carbon dioxide as they grow, Coldplay figures the mango trees will eventually neutralize all the CO_2 released in the making and selling of its CDs.

It's a sweet deal all around. Coldplay gets to do right by the environment; the impoverished Indian villagers not only get the mangoes but will also earn money from the CO_2 locked in the trees when the gas is sold on a surging new market—one that trades carbon saved for carbon burned.

Capitalism is nothing if not adaptive, and its champions have responded to global warming with a market-based solution that provides polluters with a profit incentive to mend their ways. It's called cap and trade, and it is the mechanism behind the so-called carbon markets spawned by the Kyoto Protocol. Firms in developed countries that pump out more CO_2 than they are allowed under limits imposed by Kyoto are required by the protocol to offset that pollution by buying credits on the carbon market. Those that cut CO_2 emissions below their allowance or help polluters in developing nations clean up their act get to sell the credits—as do groups that cut greenhouse gases by, among other things, planting trees.

You don't have to wait fo Washington to tell you t reduce emissions. You can follow the lead of forward-thinking governments, retailers, artists and even a utility company

BALANCING ACT
Coldplay, above in Chicago last May, fun tree planting and forest protection to neutralize its contribution to global warm

Since January 2005, carbon markets in the European Union have traded at least 500 million tons of CO_2. Because the Bush Administration dropped out of Kyoto, the U.S. doesn't participate in this booming global trade. But state governments are starting to set up regional carbon markets based on caps they establish under their own authority. In December, seven Northeastern states led by New York agreed to cut power-plant emissions via cap and trade, beginning in 2009.

For now, U.S. firms that want to trade emissions must join the Chicago Climate Exchange, a voluntary but legally binding bourse whose members, according to founder Richard Sandor, account for 8% of the greenhouse emissions from stationary sources in the U.S. "If we were a country," he says, "we'd be roughly the size of Britain." Members of the Chicago exchange, including Ford Motor Co. and DuPont, have pledged to cut their emissions 4% by the end of this year from the levels they averaged from 1998 to 2000. They have already taken tens of millions of tons of greenhouse gases out of play, which sounds impressive until it's compared with the 6 billion-ton plume of CO_2 spewed into the atmosphere by the U.S. each year.

Meanwhile, the opportunities to offset emissions are growing. Conservation International, for instance, helped Mitsubishi and Pearl Jam funnel their offsetting funds into rain-forest protection in Madagascar. And Coldplay did more than enough to offset its last album, *X&Y*, by protecting forests in Mexico and Ecuador. Internet ventures with names like TerraPass, myclimate and DriveNeutral enable commuters and air travelers to calculate their emissions and neutralize the damage. Some even aim to turn a profit.

How do the consumer offsets work? Take the nonprofit Carbonfund.org. It sells absolution for personal and commercial emissions at a cut rate of $5.50 per ton of CO_2. (A full year of carbon neutralization typically costs $99.) Carbonfund allows buyers to choose where their money winds up—in alternative energy, forest conservation or energy efficiency. Co-founder Eric Carlson says Carbonfund has offset about 40,000 tons of CO_2 so far. That's not much. But its ultimate aim, he says, is to channel what support it gets into driving down the cost of clean energy—and, along the way, increase awareness of climate change. "There is an educational value in these things," says Judi Greenwald of the Pew Center on Global Climate Change. "People realize that what they do can make a difference." So, apparently, do rock stars. ***—By Unmesh Kher***

SWEDEN

CLEANER AIR OVER SCANDINAVIA

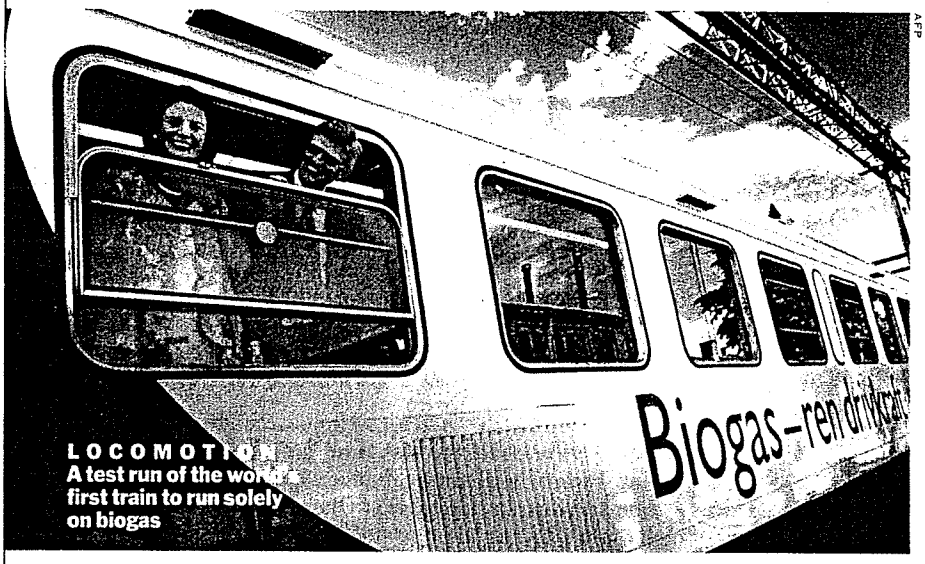
Like the U.S., Sweden is addicted to oil. Unlike the U.S., it has a plan to kick the habit—and a deadline. By 2020, says Mona Sahlin, Minister for Sustainable Development, the country will no longer be dependent on fossil fuels. "By then," she declares, "no home will need oil for heating, no motorist will be obliged to use petrol [gasoline] as the sole option available."

Can Sweden do it? Probably. Back in 1970, before the first Middle East energy crisis, Sweden got 77% of its energy from oil. By 2003, even though industrial production had risen dramatically, that figure had dropped to 34%. Part of the country's impressive record comes courtesy of its abundant resources. "We have access to large amounts of hydropower," admits Sahlin, "large amounts of biomass and good conditions for increased use of wind power."

But that's not the only reason Sweden was rated the world's second greenest nation (just behind New Zealand) in a study issued at this year's World Economic Forum in Davos, Switzerland. Sweden's leaders have passed laws that would be unthinkable for a U.S. politician—taxes on fuel and CO_2 emissions to induce car owners to trade in their gas guzzlers for hybrids, for example, and tax exemptions for home owners who switch from oil heating to renewable energy. Indeed, whereas Americans are likely to complain about higher taxes or infringements on their rights, most Swedes seem to embrace the idea of helping save the planet.

Take, for example, Sweden's nationwide rush to convert cars from gasoline to fuels like ethanol and biogas fermented from plant waste. Stations that sell alternative fuels are springing up all over the country, and fully 13% of new autos sold in February, the most recent month for which numbers are available, can run on ultra-low-emission substances.

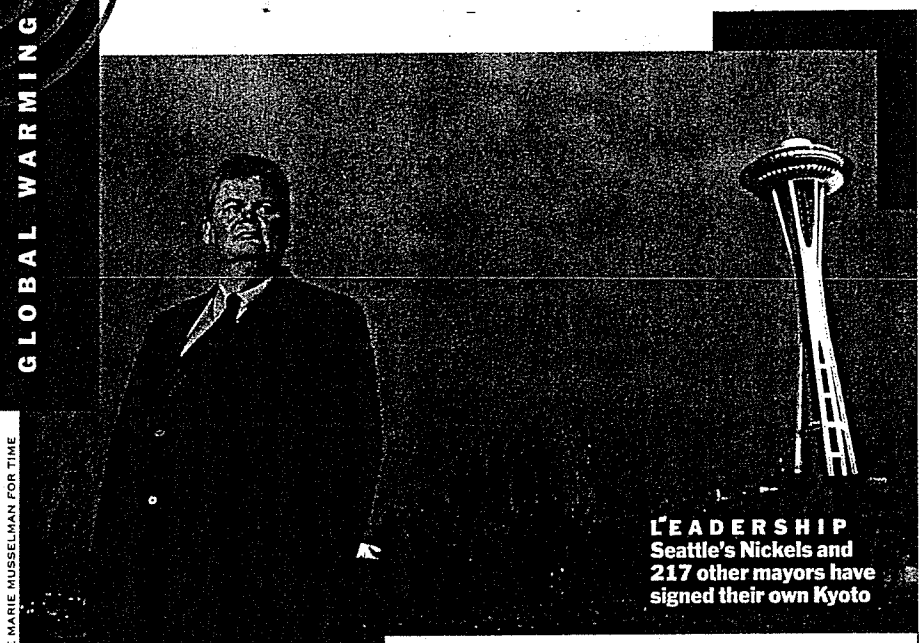
What Americans might appreciate is the way local governments are encouraged to come up with their own strategies for meeting the national goals. For example, in Helsingborg, a coastal city of 120,000, buses run on biogas made from garbage and other organic waste from households and nearby farms. It's part of a program that dates from 2000, when city officials decided they would get 20% of municipal vehicles running on renewable fuel by 2010. By 2004, they had reached 23%. "We have upped our target so that 50% of the city's cars, vans and trucks should use renewable fuel by 2010—and we will meet that target," says Ulla Ingers, Helsingborg's assistant director of environment.



AFP

LOCOMOTION A test run of the world's first train to run solely on biogas

Similar programs are under way across the country. In the northern town of Aapua, a wind farm opened just last month, thanks to local residents who began lobbying town officials five years ago; it should supply 40% of Aapua's electricity. The old university city of Lund gets 30% of its heat from a geothermal plant. And Fjaras, in the southwest, just opened a solar-powered health center. Some of these are small efforts, to be sure, but when an entire nation embraces a pledge to wean itself from oil, there's no reason it can't be done. ***—By Michael D. Lemonick. Reported by Ulla Plon/Helsingborg***



ANNIE MARIE MUSSELMAN FOR TIME

LEADERSHIP Seattle's Nickels and 217 other mayors have signed their own Kyoto

THE MAYORS

SAVING ONE CITY AT A TIME

Seattle mayor Greg Nickels has news for President George W. Bush: global warming is also "local" warming. So for Nickels and his constituents, climate change is about the Cascade Mountains, where the city gets its water and hydropower and where the snowpack has shrunk by half over the past 50 years. It's about the effect of Puget Sound's warmer waters on wild-salmon runs. It's about hotter summers cooking up more smog. It's about a rise in sea level that could flood Seattle's port. "The stakes are high—globally and locally," he says. "We need to act."

So in February 2005, when the Kyoto Protocol took effect in 141 countries but not the U.S., Nickels launched the U.S. Mayors' Climate Protection Agreement. So far, 218 mayors in 39 states, representing nearly 44 million Americans, have signed on to its 12-step program for their own cities to meet or beat Kyoto's original target for the U.S.—cutting greenhouse-gas emissions to 7% below 1990 levels over the next six years. Some cities got a head start. Portland, Ore., which zeroed in on global warming beginning in 1993, has already slashed emissions by 13% per capita, partly by building light rail and 730 miles of regional bikeways. In Austin, Texas, the city-owned utility was able to cancel construction of a 500-MW coal-fired power plant—planned to power 50,000 homes—thanks in part to an intensive green building program that offers energy-efficiency audits to all residents and businesses, retrofits schools and installs insulation and shade screens to reduce sunlight in low-income housing. "We're frustrated by the lack of national leadership," says Mayor Will Wynn, an early backer of the Nickels initiative. "This is about the future of the planet."

Other cities are crafting their own solutions. St. Paul, Minn., which has had to forgo Winter Carnival ice sculptures and on-ice softball tournaments in recent years because of rising temperatures, is using a biomass-fired power plant for both heat and electricity. Keene, N.H., is harnessing methane and other gases at its landfill to run a generator that powers its recycling center. Salt Lake City, Utah, has converted 1,630 traffic stops to energy-efficient light-emitting diode signals—which alone will save more than 500 tons of CO_2 pollution each year and cost the city $53,000 less than conventional bulbs. "The idea is to solve global warming one city at a time," says Glen Brand, an energy specialist for the Sierra Club, which has launched a "cool cities" website.

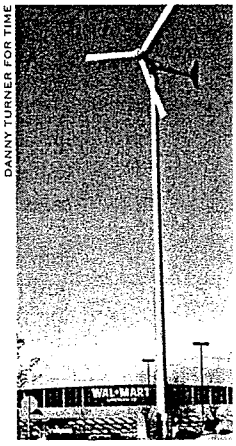
But though mayors prefer to downplay the costs of fighting global warming, there seems to be truth to the Bush Administration's contention that meeting the Kyoto targets involves pain—not just gain. And in Seattle, where population growth is projected to push up regional greenhouse gases by 38% in the next 15 years, ratcheting down to 1990 levels would require slashing emissions by 683,000 tons—the equivalent of taking some 148,000 cars off the road. To do that may require such unpopular measures as highway tolls and increased parking taxes. But in the absence of federal controls, Nickels says, he's ready and willing: "If it's not going to happen from the top down, let's make it happen from the bottom up." *—By Margot Roosevelt*

THE RETAILER

THE GREENING OF WAL-MART

All around the world, shoppers flock to Wal-Mart to buy everything from socks to sofa beds. In McKinney, Texas, they come for another reason: to see the wind turbine. Rising 120 ft. above the ground, it's the tallest structure in town and supplies 5% of the store's electricity. It's not the only thing that makes this Wal-Mart a green giant. There are photovoltaic shingles on the roof, exterior walls coated with heat-reflective paint and a high-tech system that automatically dims or raises the lights depending on whether it's sunny or overcast. Brent Allen, who manages the experimental store, says customers tell him all the time that "they drove out of their way to shop at this Wal-Mart." Which makes you wonder: If folks drive farther than they have to, aren't they burning extra gasoline in their pickups and SUVs? And isn't that offsetting the store's energy savings?

The laws of unintended consequences can be cruel for companies trying to do the right thing. The laws of economics suggest that Wal-Mart is so big, with 5,200 stores worldwide, that it influences everything from the price of lumber to the size of the container your laundry detergent comes in. And if this retailing giant throws its weight behind environmental responsibility, the impact could be profound: less air pollution at factories in China, mass-market sales of organic products, cereal boxes that aren't half filled with air. "One little change in product packaging could save 1,500 trees," says Wal-Mart CEO Lee Scott. "If everybody saves 1,500 trees or 50 barrels of oil, at the end of the day you have made a huge difference."



DANNY TURNER FOR TIME

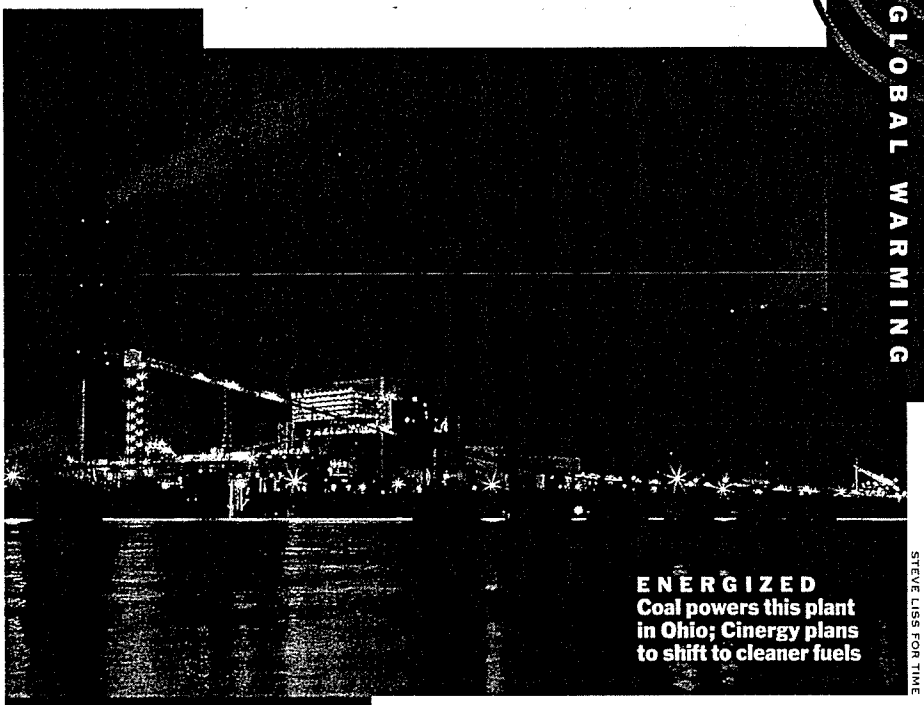
Scott wants Wal-Mart to do its part too. He has promised to cut greenhouse-gas emissions at existing stores 20% over the next few years and pledged to construct new stores that are 25% to 30% more efficient. He wants Wal-Mart's fleet of more than 7,000 trucks to get twice as many miles per gallon by 2015. Factories

that show Wal-Mart they're cutting air pollution—even those in China—will get preferential treatment in the supply chain. Wal-Mart says it's working with consumer-product manufacturers to trim their packaging and will reward those that do so with prime real estate on the shelves. Scott has pledged to enlist Wal-Mart's army of lobbyists to push for pro-environmental policy changes in Washington, including incentives for utilities to cut greenhouse gases.

Cynics might call it a "greenwash," a bid to deflect attention from Wal-Mart's controversial labor and health-insurance practices. But it's not just window dressing, because Wal-Mart sees profit in going green. "We are not being altruistic," says Scott. "This is a business philosophy, not a social philosophy." Some top environmentalists seem convinced he's serious, including Amory Lovins, head of the Rocky Mountain Institute, who is a paid adviser. "We don't go where we don't think there's a genuine interest in change," says Lovins.

There's no question that soaring energy costs are fueling Wal-Mart's conservation drive. The company now insists that truckers shut off their engines when stopping for a break, yielding estimated savings of $25 million a year. By doubling the gas mileage of the fleet through better aerodynamics and lower-friction tires, Wal-Mart expects to pocket $310 million a year. One of the biggest items on its energy bill is lighting. Instead of going with the cheapest bulbs, the company is experimenting with costlier LED strips for refrigeration units that last longer and use less energy. Scott also wants to sell more organically grown food and cotton clothing, partly because it's good for the planet, partly because he believes he can get prices down and boost sales to low-income customers.

Like Bill Gates, who started his charitable foundation shortly after Microsoft's antitrust trial, Scott happens to be burnishing Wal-Mart's image at a time when his company's reputation is under siege. He acknowledges that he launched the plan partly to shield Wal-Mart from bad press about its contribution to global warming. "By doing what we're doing today you avoid the headline risks that are going to come for people who did not do anything," he says. "At some point businesses will be held accountable for the actions they take." Meanwhile, should Wal-Mart succeed at shrinking its environmental footprint and lowering prices for green products, both the planet and the company will profit. Sam Walton would have liked that. ***—By Daren Fonda. Reported by Steve Barnes/Bentonville, Rita Healy/Denver and Adam Pitluk/McKinney***



ENERGIZED Coal powers this plant in Ohio; Cinergy plans to shift to cleaner fuels

STEVE LISS FOR TIME

THE UTILITY

ASKING TO BE TAXED AND REGULATED

Jim Rogers runs a power company that spews 62 million tons of carbon dioxide into the atmosphere each year. That's a lot of greenhouse gas. But you won't find him on the hit list of environmental crusaders. The CEO of Cinergy, a utility with nine coal-fired plants in Indiana, Ohio and Kentucky, Rogers is an outspoken advocate of regulating carbon and imposing a price on emissions. His position makes him a renegade within his industry, which officially opposes any regulatory scheme that would force power companies to cut carbon emissions. It makes Rogers more likely to be invited to Sierra Club headquarters than to the White House, given that President Bush hasn't called for anything more stringent than voluntary cuts in greenhouse gases.

What is Rogers thinking? For one thing, he's personally worried about global warming and believes that the scientific debate about what causes it has long been settled. He thinks that the U.S. will be forced to regulate carbon—as most other industrialized countries have done—within the next five years, if not sooner. And as the CEO of a publicly traded company, he has to make decisions that will affect shareholders decades in the future. Power plants have life spans of 50 years, and if carbon is taxed, the fuel calculus of those plants changes radically. "We're very dependent on coal," says Rogers, "and if you're going to have earnings growth that's sustainable over a long period of time, you [need] certainty on the carbon issue."

With the approval last month by Cinergy's board of a merger with Duke Energy, Rogers is poised to run one of America's largest utilities, and he aims to lead by example. In recent years, Cinergy has spent $1 billion to increase its use of cleaner-burning natural gas, including $200 million to convert a coal-fired plant, and Rogers has cut Cinergy's reliance on coal from 87% of its fuel to 73%. He has pledged to reduce Cinergy's CO_2 emissions 5% below 2000 levels by 2012, and he is investing in projects to sequester carbon in forests. Rogers is evaluating coal-gasification technology for a plant in Indiana, which could dramatically cut carbon emissions from burning coal, still the least expensive and most abundant fossil fuel in the U.S.

Even if he succeeds, Cinergy's environmental record will be far from perfect. A $1.4 billion settlement with the Environmental Protection Agency over alleged violations of the Clean Air Act fell apart when Cinergy backed away from the deal. The original suit is slowly working its way through the courts. And Cinergy supports Bush's efforts to roll back provisions of the Clean Air Act that govern utilities.

But with global warming, Rogers vows to keep the heat on his colleagues in the energy industry and on Washington politicians. "My greatest fear is that we don't deal with the problem now," he says, "and we wake up one day and don't have enough time." ***—By D.F. Reported by David Thigpen/Cincinnati***